

7.3 Movements of Earth and the Moon

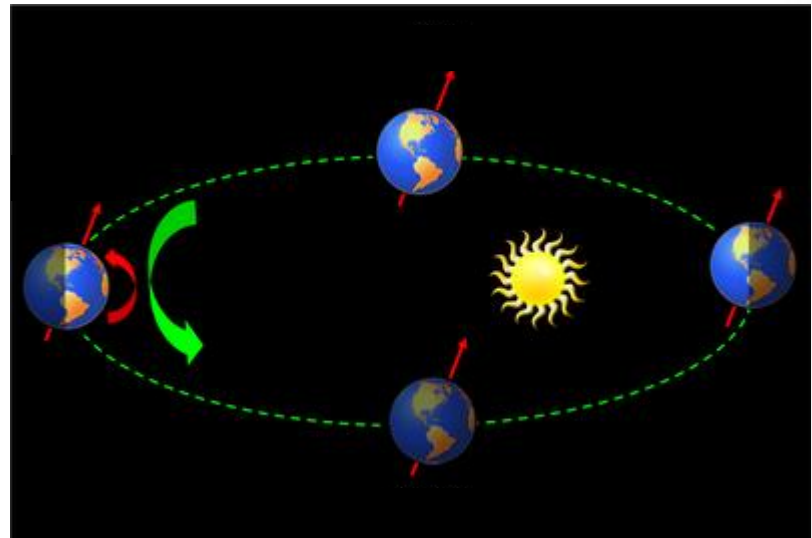


<https://www.youtube.com/watch?v=IfG2-FFL6fY>

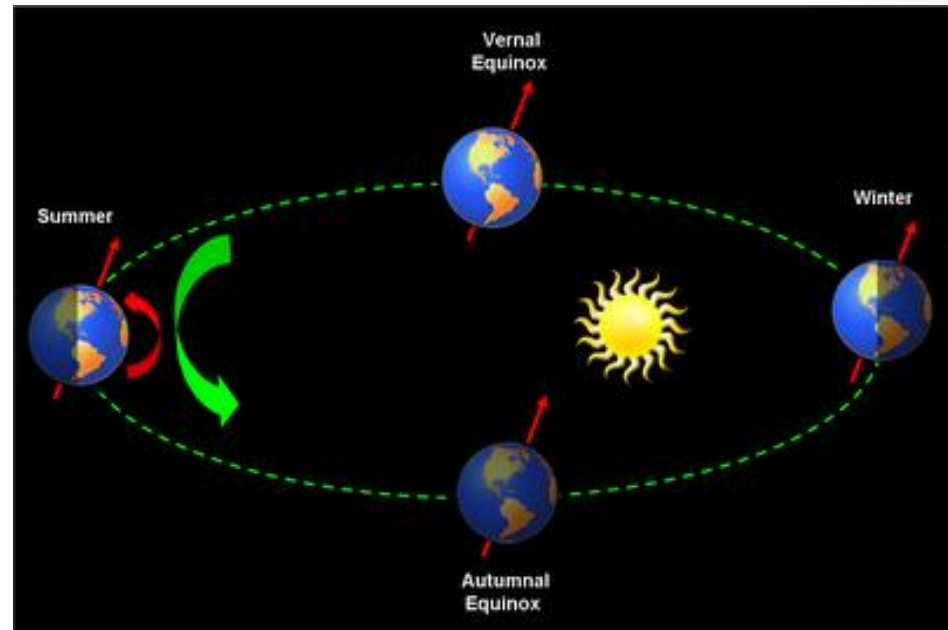
Earth's Motion

- Due to the rotation of the Earth on its axis, celestial objects seem to rise in the East and set in the West, and causes our tides.
- The revolution of the Earth gives us our seasons and allows us to see different constellations during the year.
- The orbit of the Earth is an **ellipse** (not a perfect circle), and the sun is not in the middle!

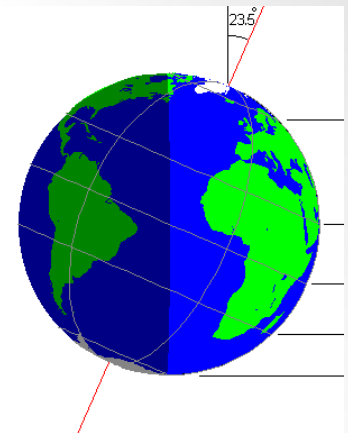
Are we closer to the sun in the summer?



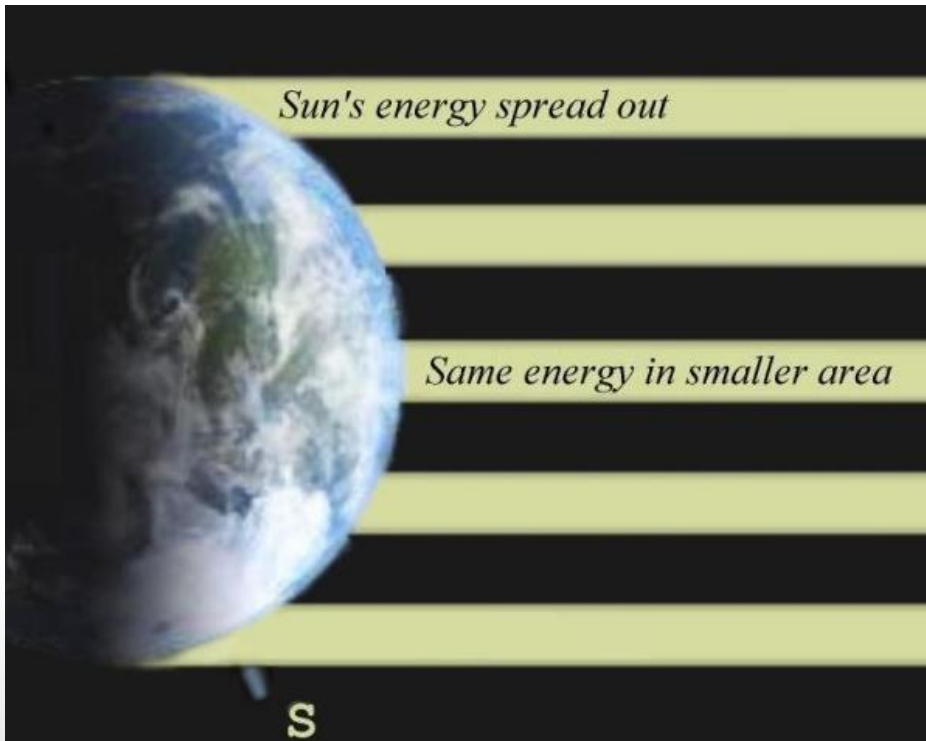
- The Earth is closer to the sun in winter, and further away in summer!
So what causes the seasons?



Why do we have seasons?



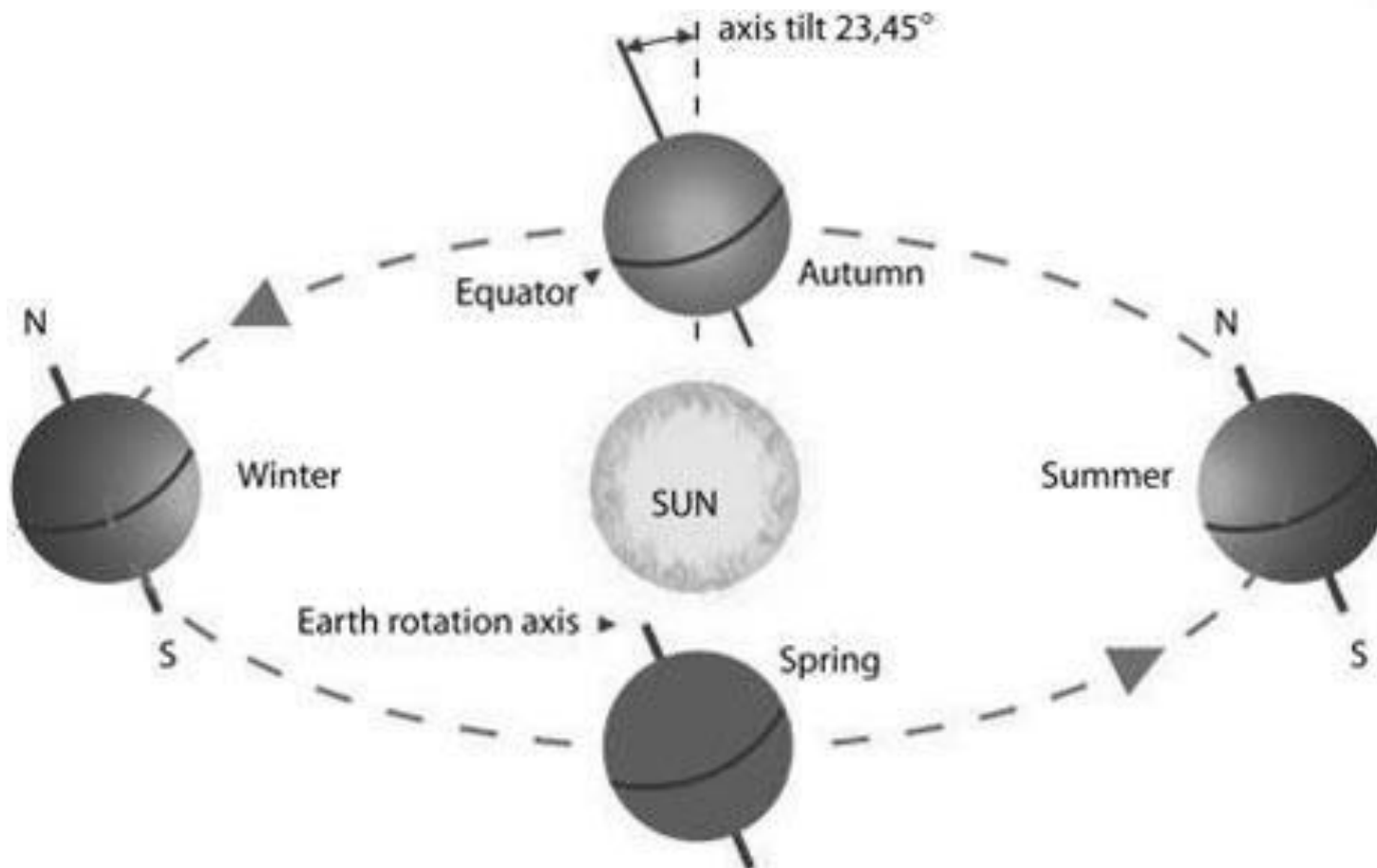
- Axis of the Earth is tilted (23.5°)
- Because of the tilt, sunlight hits the earth at different angles



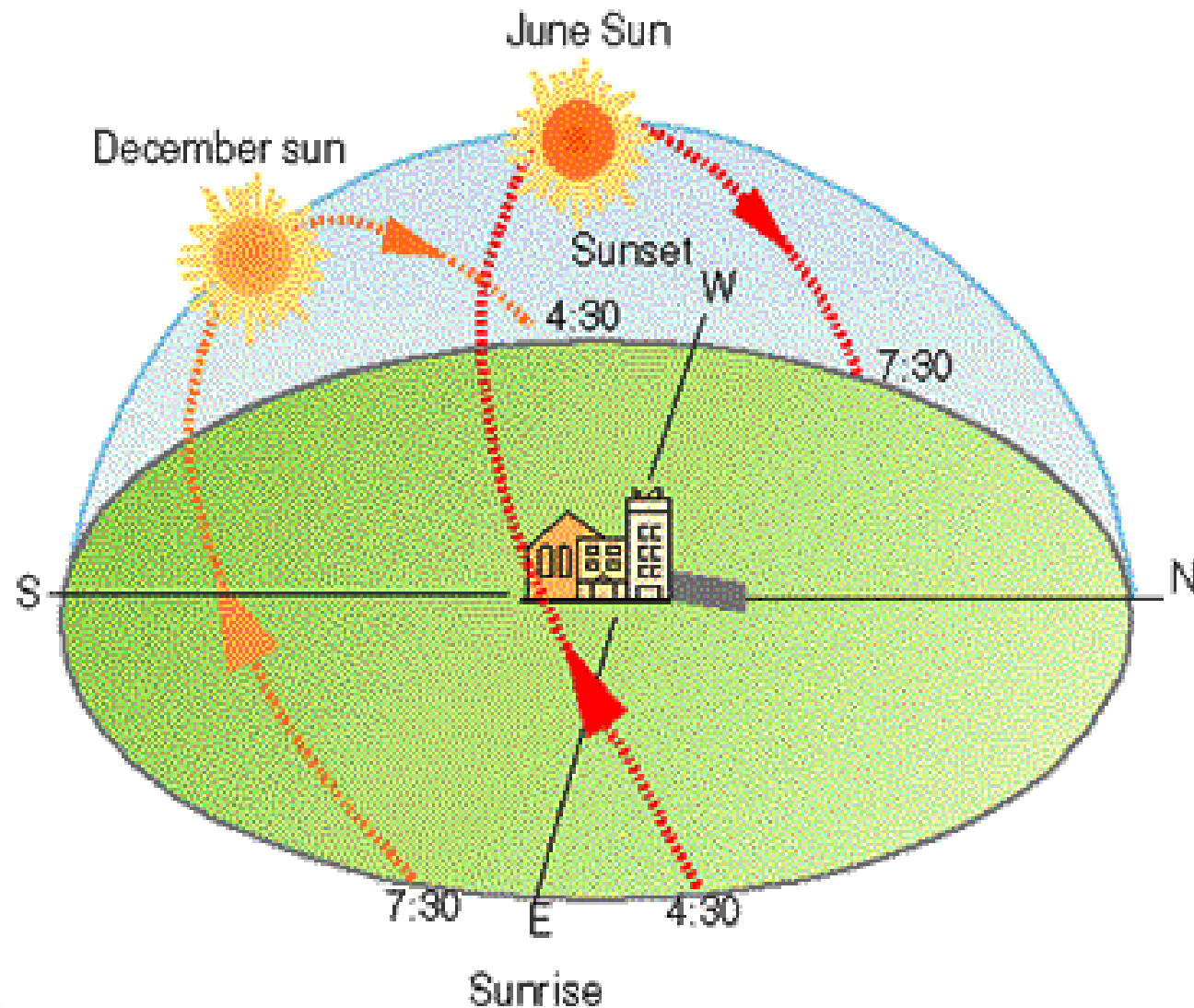
LOW ANGLE: Sunlight here is more spread out = less energy = less heat

GREATER ANGLE: Sunlight here is more intense = more energy = more heat

Draw this:



- In the summer the sun's angle is larger (more intense) for a longer period of time



Reasons for the Seasons (animation):

Winter	Summer
The northern hemisphere is facing away from the Sun.	The northern hemisphere is facing towards the Sun.
Sun appears lower in the sky so the light rays are more diffuse and do not warm the ground.	Sun appears higher in the sky so the lights rays are more direct and the heat warms the ground effectively.
Shorter daylight hours.	Longer daylight hours.

animation

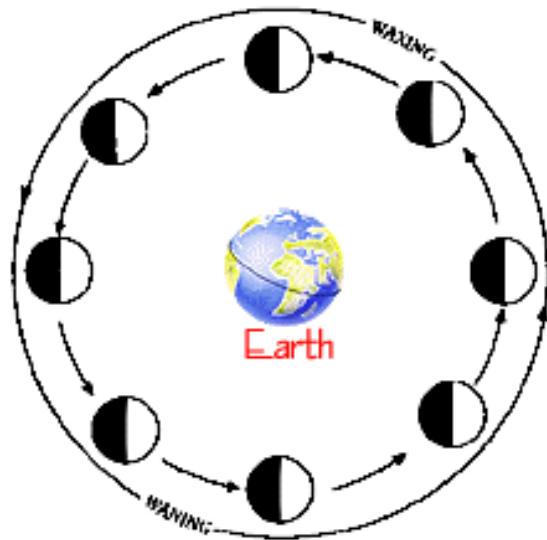
Note: Luminous vs Non-Luminous

- Luminous objects, like the stars, emit huge amounts of energy in the form of light.
- Non-luminous objects, like the planets & moons, do not emit their own light. We can see them in the sky only when light from the Sun reflects off them toward Earth.

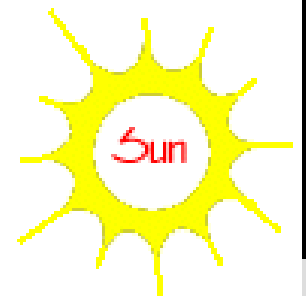
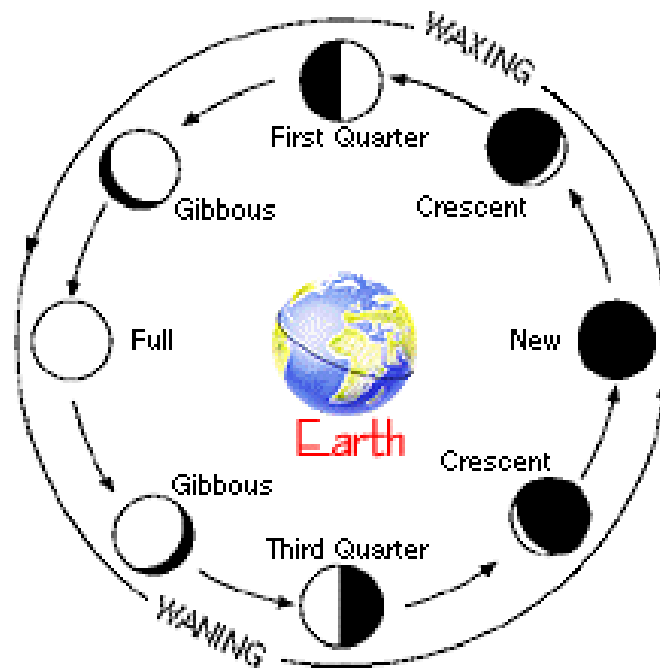
The Moon's Motion

- Revolves around the Earth every 27.3 days
- As the moon revolves around the Earth it rotates so the same side of the moon always faces the Earth.
- The 'dark side' should be called the 'far side' as it does actually get light (we just don't see it).
- The **phases of the moon** are what you see depending on the position of the moon:

Moon, Earth, Sun as viewed from above our Solar System



The Moon as seen from Earth



New Moon



Waxing Crescent



First Quarter



Waxing Gibbous



Full Moon



Waning Gibbous



Last Quarter

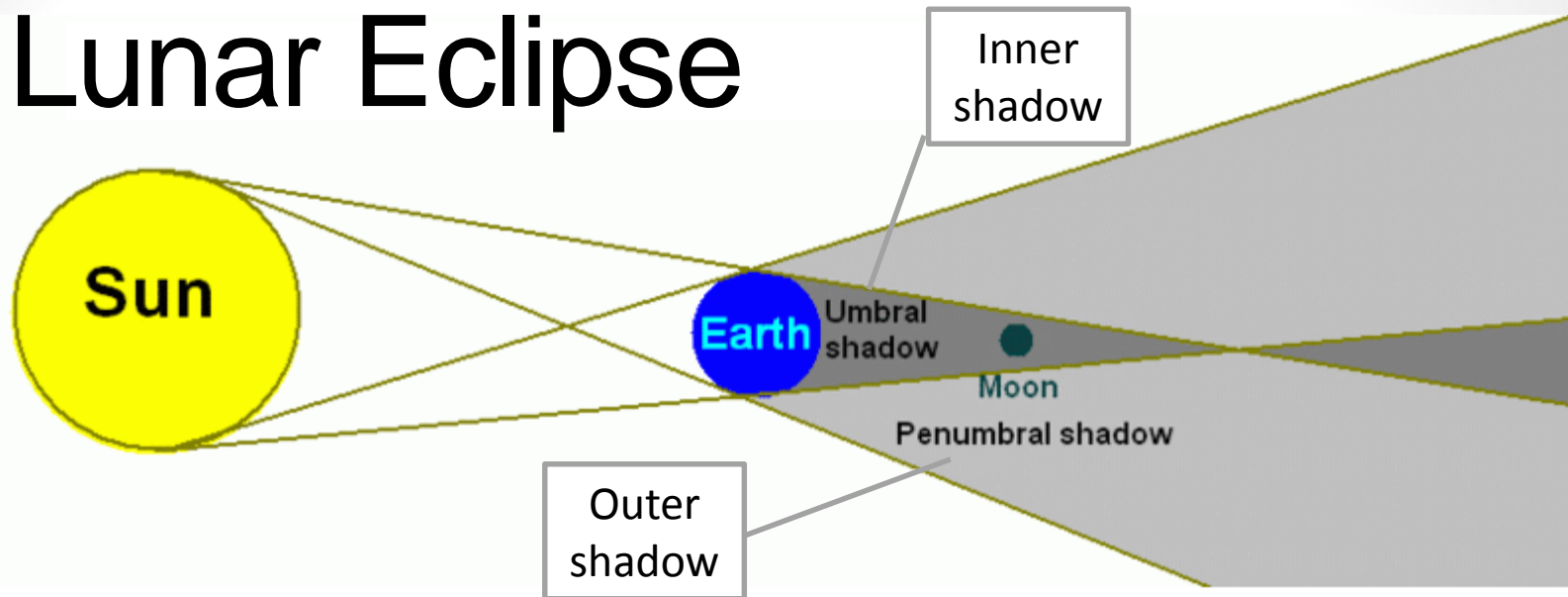


Waning Crescent



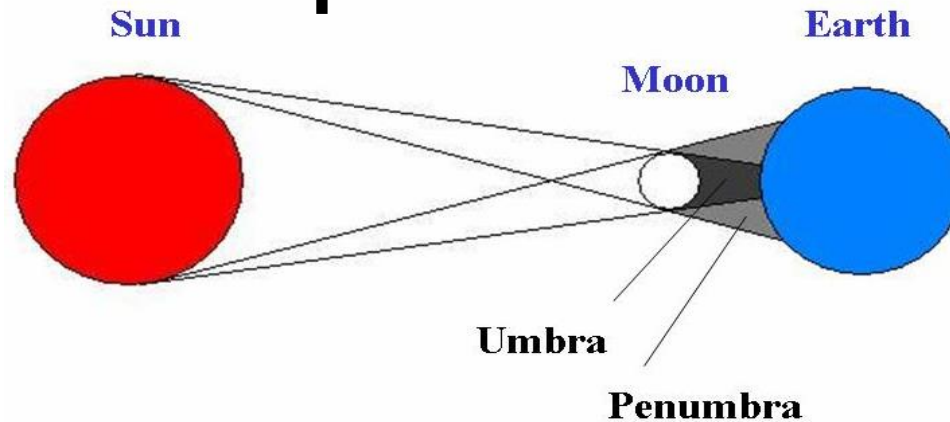
<http://www.sumanasinc.com/webcontent/animations/content/moonphase.html>

Lunar Eclipse

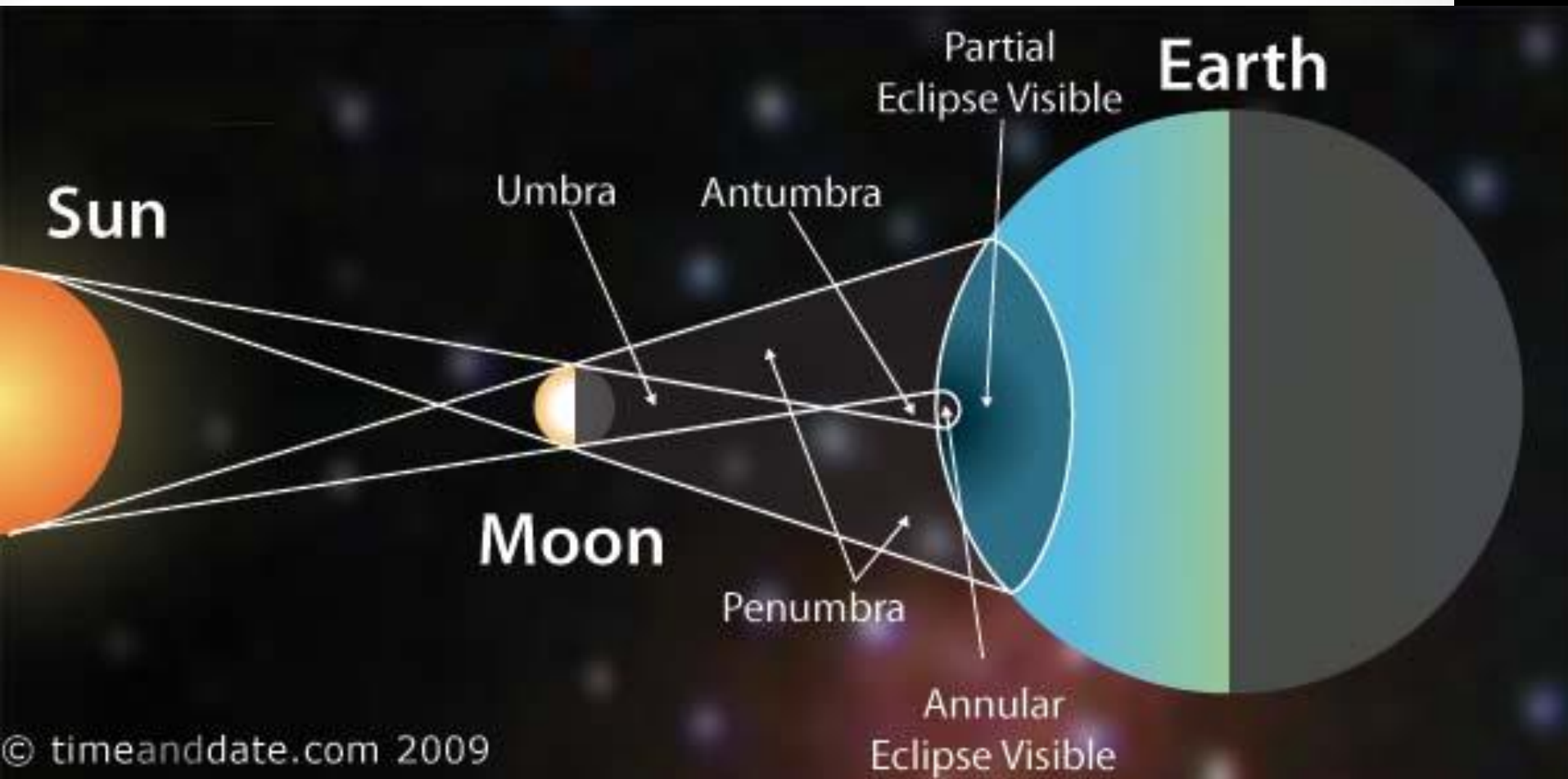


- A lunar eclipse is when the Earth is directly between the Sun and the Moon.
- When this happens the Earth casts a **shadow** on the Moon and when we look into the sky we can not see the Moon. ([animation](#))
- Occurs twice a year, not more because the orbit of the moon is tilted slightly, so the moon often passes above or below the Earth's shadow.

Solar Eclipse

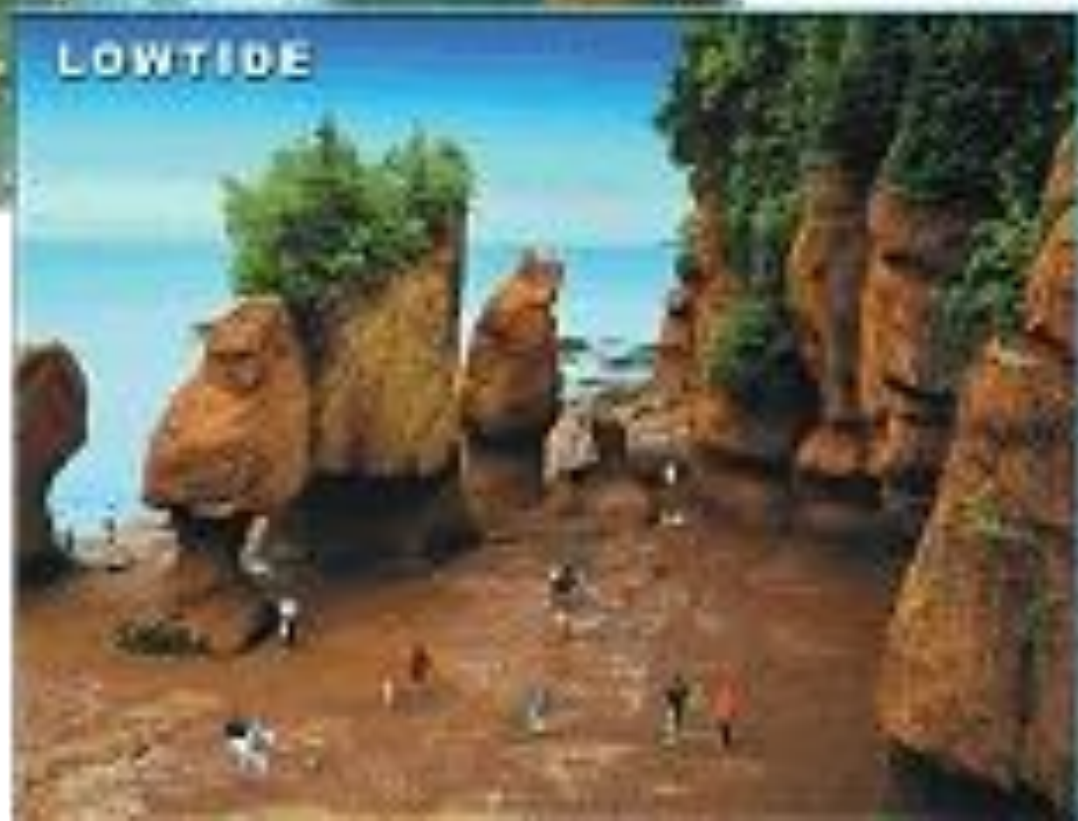
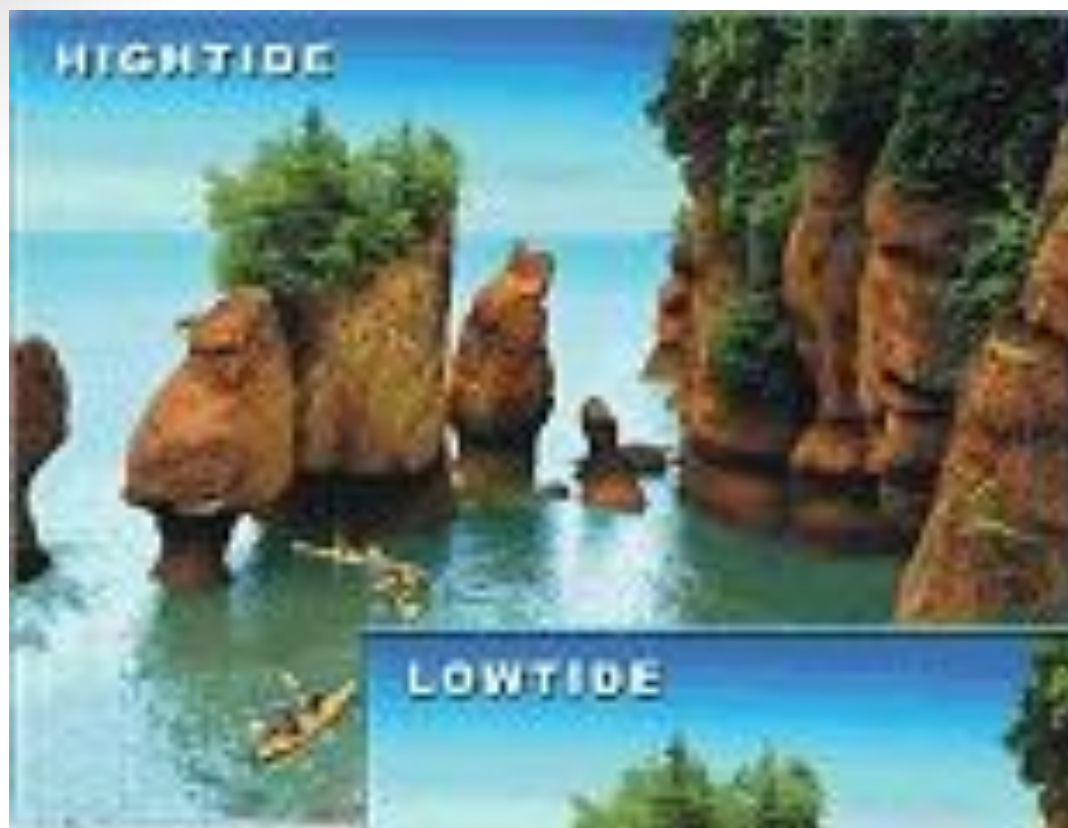


- A solar eclipse is when the Moon is directly between the Sun and the Earth.
- When this happens the Moon casts a shadow on the Earth and when we look into the sky the Sun is blocked by the Moon.
- A solar eclipse occurs during the day and depending on your location on the Earth you may see a partial eclipse or a total eclipse. ([animation](#))
- Never observe directly with your eyes!!!



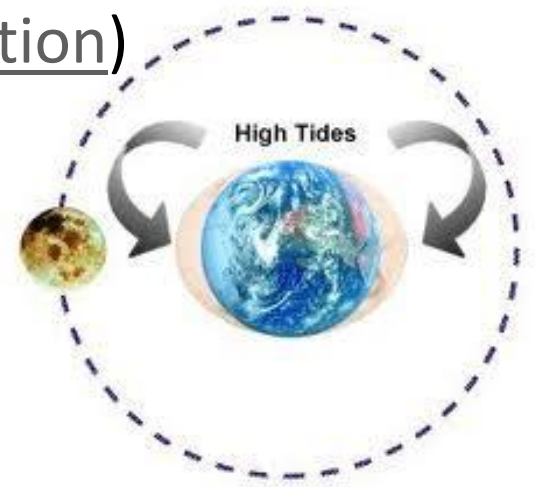
Tides

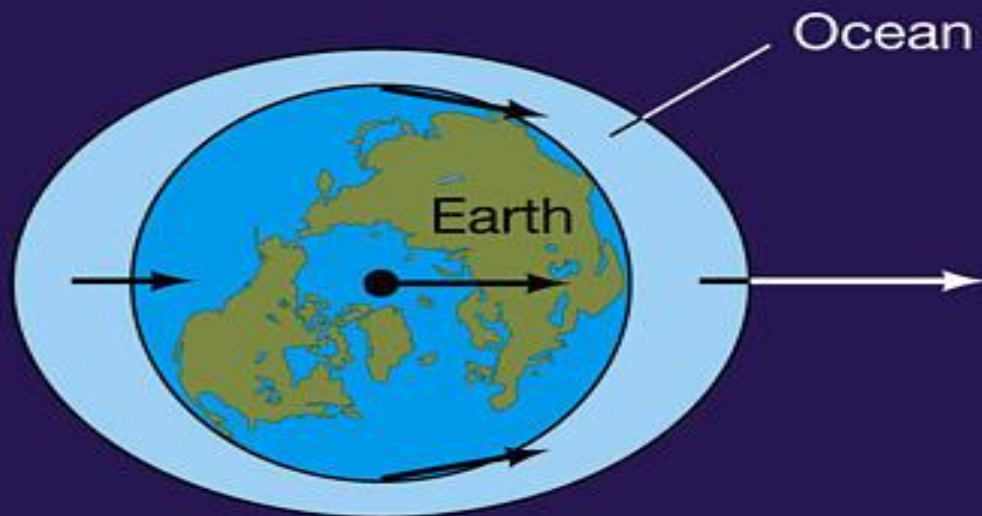
- Caused by the movement of the Moon.
- Animation
- Recognizable in coastal regions
 - (Bay of Fundy → 16 meter tides)





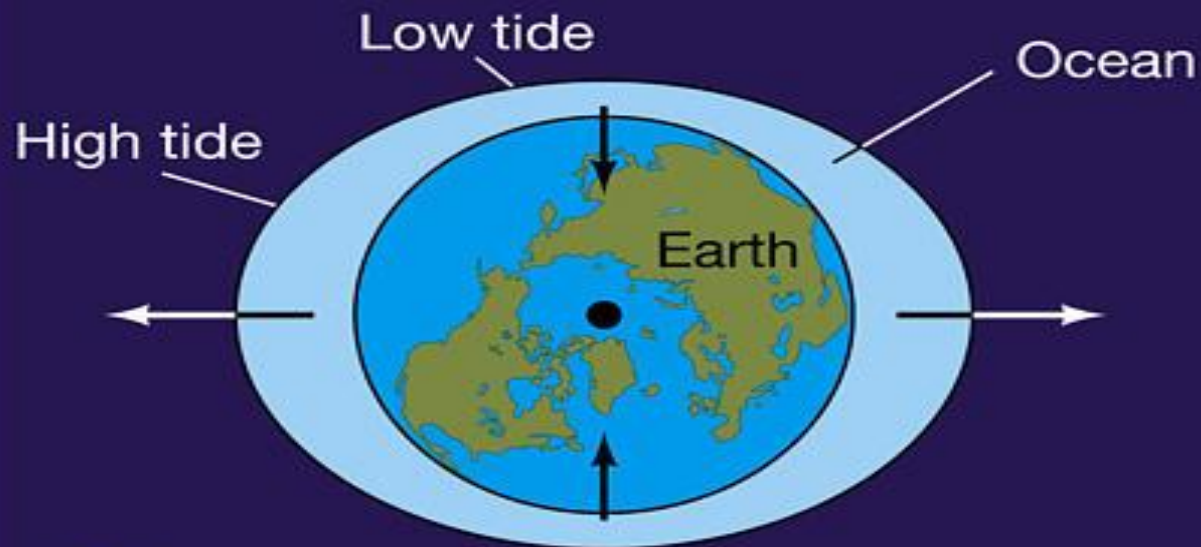
- Caused by the force of gravity, which is the force of attraction between masses.
 - The larger the masses, the greater the gravitational force is.
 - The farther the objects are from each other, the less the gravitational force is.
- Think of this as mutual pulling – the Earth ‘pulls’ on the moon, keeping it in orbit around the Earth
- The moon ‘pulls’ on the Earth, causing it to ‘stretch’ , this effect is called tidal force ([animation](#))





(a)

Moon



(b)

Moon

- Practice hands-on activity (moon phases using sport balls)
- Read p. 322 to 329
- p. 327 #1 to 5